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Plant Liquid Extracts as Low Cost, Fast Release Fertilisers for Vegetable Production in Tropical Countries

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Abstract

Vegetable production can play an important role in improving livelihoods of small-scale and resource-poor farmers in tropical countries, since vegetables constitute an opportunity for both diet improvement and higher income. In vegetable fertilisation, nitrogen is one of the most important nutrients. However, chemical nitrogen fertilisers are becoming more expensive and often out of reach for smallholders, while common organic fertilisers have a slow nutrient release compared to these. Therefore, there is a need for a quick-acting and cheap N fertiliser suitable for vegetable production. Liquid organic extracts for fertilisation are widely used in many tropical countries, but few scientific studies have been made to understand their efficacy. In some places green papaya - containing papain, a protease enzyme - is used to catalyze N mineralisation, but this process is also under-researched. One aim of the study was to understand the dynamics of N release and mineralisation from plant litters (with and without papain) during the extraction process and to test their fertilising value. Another objective was to better understand the relevance of the use of liquid organic extracts in developing countries and their actual production process and application methods. Laboratory and greenhouse trials were carried out in Italy, while qualitative research was conducted in Cambodia. In Italy, chemical analysis of extracts made from two crop residues showed that the N mineral fraction in solution is mainly ammonium and that papain increases the mineral N release from litters. 25 to 40 % of the litter N was recovered in the liquid fraction after 10 days of extraction. Extracts were used as fertigation on lettuce, and various growth and nutritional parameters were evaluated. However, results were flawed by high levels of salinity causing osmotic stress. In Cambodia, the survey confirmed the relevance of liquid organic extracts as a quick-acting and cheap N fertiliser and information on preparation and use of liquid compost was collected. The use of liquid extracts for fertilisation has good potential for vegetable production in developing countries, but further research is still needed in order to clarify the aspects left unresolved by the present study.

Keywords: Fertigation, liquid compost, N mineralisation, organic liquid extracts, papain, tropical countries, vegetable fertilisation